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Piece Dye Kettles

The Improvement of Dyehouse Machinery—Developments in the Woolen-Worsted Piece Dye Kettle—Its Construction—Reels—Front Partitions—Load—Steam Removal

By RAYMOND R. STEVENS, B.T.C.

Overseer of Dyeing, Felters Company

IN the picker room the picker receives close attention; the card room the card; the weave shed the loom; in the dyehouse the machinery is neglected. A few years ago this statement was true of a far greater number of mills than it is to-day.

The improved dyehouse conditions, where they have taken place, have been due in many cases to a combination of the following factors:

(a) The increased number of mill executives who have had actual dyeing experience and are now in a position to improve the old conditions. This increase has been due to the willingness of dyers to consider their work as a step toward higher positions and not as a secret trade or mysterious art and the key to their existence.

(b) The introduction of mill laboratories and chemists which have given many dyers more time to think of aids to increased production and improved quality of their outputs.

(c) The tendency of many mills towards taking advantage of the experience gained by machinery manufacturers in lowering costs of standard types of machinery, whereas previously the mills had been making their own vats, tubs, kettles, etc., dependent upon their own experience and facilities only.

(d) The introduction of rayon and novelties which have necessitated special care in handling during wet processing and has led to an interest in improved dyeing machinery as a whole.

(e) Employment by many mills of textile engineers who have viewed dyeing machinery in the same light as all mill machinery and have appreciated the chance for improvement more than the mill manager who was by necessity more interested in fastness of the shades obtained, duplication of results, new color possibilities, etc.

One of the most used dyeing machines in the woolen industry is the reel machine or woolen-worsted piece dye kettle. It is one of the simplest machines used in a dyehouse, yet that may have been one reason why, until recently, so little has been done along the lines of investigation of its possibilities or of improvements.

Six or eight years ago in many dyehouses there was not a doffing reel on a dye kettle. Many kettles were drained by pulling out a wooden plug. Belts slipped. Nail holes or rips from protruding heads in the slatted racks used to shunt the goods forward in the kettles were not uncommon. All this at a time when machinery in other parts of the mill had been well developed.

If the outlining of developments that have recently taken place in this universally used machine and of the resulting improvement in quality and production as noted in one particular plant should stimulate interest in other users, then the writer's purpose will have been accomplished.

Let us consider that we have the problem of improving the reel machine in the average woolen or worsted dyehouse installed from eight to ten years ago, first tracing in a general way the progress already made. Ten to twenty years ago the winch dye beck or reel machine consisted of a tub or square vat with a slatted roll, called a winch, fastened over it. (Fig. 1.) This winch was at one time turned by hand. This beck sometimes carried a wooden roll (a) in the bottom supposedly to aid in the passage of the goods through the vat.

Fig. 2 illustrates an improvement over Fig. 1 in that the circulation of the goods through the kettle was aided by inserting in the vat a slanting slatted gate or false bottom which slid the goods forward in the bottom of the kettle so they would draw up more easily at the front. Flocks, dyestuff and sludge collected behind this false bottom, causing off shades as the color of successive batches was changed. The fabric also was often damaged by catching upon nail heads or the false bottom itself. To overcome these and many other defects the modern types of reel machines were developed.

The new reel machine was built to give the proper movement to the goods and yet get away from the false back or bottom. It ceased to resemble a box and took the form of a semi-cylindrical vat; a curved side at the back and a straight side at the front. Many arguments took place in different dyehouses at this time as to whether the loss of the volume of liquor resulting from the abolishment of the false bottom or, in other words, the shortening of the bath, affected materially the levelness of the dyeing. At this time also some attention began to be paid toward the capacity or production to be expected in different kettles. This phase, as well as the study of type, shape, position and speed of reels, has also received rather recent consideration.

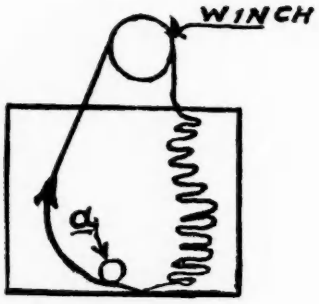


FIG. 1

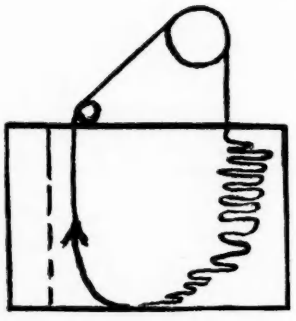


FIG. 2

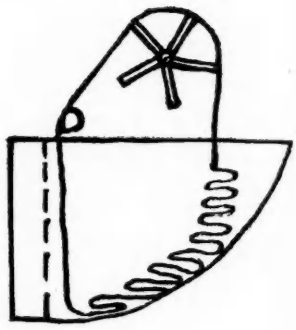


FIG. 3

To-day successful use is made of an individual motor driven, slipless, ball bearing, long life kettle. It has stainless, Monel metal rustproof fittings, canopy top, flue which removes all steam, time and temperature steam control and a design which permits of capacity loading.

CONSTRUCTION

There have been many attempts made to use several different materials for the bottoms of kettles other than wood. These include glass, porcelain, tile and many different metals. However, in by far the majority of mills wood to-day is still proving the most satisfactory material. Substitution experiments were made with the idea of overcoming such objections to wood as absorbing of dyestuff, giving a smoother surface and not drying out on exposure to air.

Successful use has been made of wood substitutes for restricted purposes. The use of glass of certain types would overcome all the objections to wood, but its adoption is most difficult, not only from the point of view of the user but also from the glass manufacturer. Violent striking or jarring, difficulty of installation and too sudden changing of temperature are all obstacles to be considered. Tile can be used where the liquor is not such as would attack the joints. In quite a few mills a partial use of Monel metal has been made. In doing so it should be noted that no soldering of joints can be carried on, due to the chemical action of dye liquors upon the solder. All Monel metal joints should be riveted or welded. Ordinarily a cast iron, steel or wooden frame is built and then lined with the rolled Monel metal.

Of the suitable woods cypress is used by the great majority of mills to-day, but recently redwood has become a factor. Redwood is more compact and has a finer grain than cypress and does not wear into the washboard effect so characteristic of cypress. The redwood apparently resists the action of many acids better than cypress and, in a general way, is a very satisfactory wood with perhaps one exception. This exception is that, as its name suggests, this wood contains a red coloring matter of an acid nature. Therefore, before any dyeing machine or vat made of redwood is used it must be boiled out with a strong caustic solution to clear the wood. If the type of dyeing permits of the use of redwood, a tub having a good length of life is assured.

The thickness of the wood used varies with different makers and construction of kettles from two and one-half to three and one-half inches. A thickness of four inches might be too great in that the outside might dry out and crack while the inside, being subjected to the liquor, would be swollen, thus causing a buckling action. A thickness of less than two and one-half inches in most cases would not be strong enough.

There are two entirely different types of construction: one, the wooden frame-work bound together with tie rods; the other, the cast iron frame, wood-lined type. The metal frame type has the advantage of allowing easy and inexpensive replacement of the wood lining when worn out. This frame also permits effective attachment of bearings, reels, motor, etc., with permanent alignment.

As to the alignment of reel machines, foundation plays an important part. Every time a dye kettle is brought to the boil it is subjected to a shaking or jarring. This is due to the fact that when an open steam jet or coil blows steam into a kettle of cold water a series of rapid expansions and contractions of

balls of steam take place. Imagine the stream of steam as it emerges into the cold water as a succession of globules or bunches of steam expanding as liberated. As the water takes up the steam and the heat is dissipated, there is an immediate contraction as the water takes up the space just occupied by the steam, thus causing the noise and jarring of the kettle. Dyehouse operatives often observe this fact and use it as an indication as to whether a kettle has reached the boil. However, this shaking does not necessarily continue to the boil, as it stops when the temperature has risen sufficiently so that the heat dissipates slowly. The question arises whether it is the best policy to firmly fasten the kettle to an immovable base and prevent, in that way, as far as possible, any change in alignment or whether to anchor the machine loosely and anticipate the effects of shaking and jarring, thus giving the kettle less strain and longer life.

Reels

The types of reels are many and varied. We have all wood, iron, Monel metal, brass, oval, round, hump, spider and drum types, each having some distinctive property, making it more suitable for one type of fabric than any other. The style most suitable for the dyehouse in question is selected after taking into consideration the weight or openness of the fabric, its tendency to wrinkle or felt, the kinds of dyehouses to be applied, the acidity of the dye bath and the effects of metal parts upon the shades to be colored.

The driving of the reel and rolls on a dye kettle are quite important. Some machine manufacturers feature a variable speed drive, enabling the dyer to change the speed of the reel during the dyeing process without stopping the machine. The advantages claimed is in not having to work the goods vigorously, except at such times as necessary in the dyeing process to insure level results or while bringing to the boil and during the addition of shading colors. The speed also could be varied to suit fabrics of different weights according to ease of penetration.

In the use of the motor-driven worm drive machine we have the disadvantages in some makes of the inability to move the reel at all when the power supply is broken off. This prohibits the temporary turning of the reel by hand to keep the goods from showing crosswise streaks at the liquor level.

The introduction of the small individual motor designed to drive the doffing reel when it is desired to unload the machine, is principally for the purposes of safety. Previously, on most kettles, the doffing reels revolved whenever the kettle was in operation, and operatives often came in contact with them.

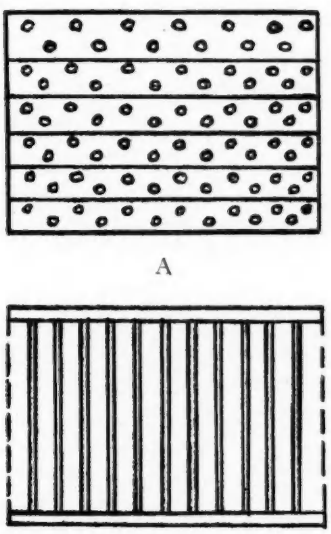
Front Partitions

A subject of recent interest in kettle design is the variation in types of front partition which forms the feed box for dyestuff additions. In most mills for many years the standard front partition has been of the perforated type as illustrated. (Fig. 4-A.)

An innovation in front partition is shown (Sketch B), the so-called "picket fence" type which aids greatly in securing uniform dyeing across the entire length of kettle. This is particularly true on long kettles where there is some tendency for the outside pieces of fabric to be a little lighter in shade than the ones nearer the center of the kettle. The picket fence style of front partition is made of round bars two inches in diameter, placed with about one-half inch of space between bars. These bars are set vertically and held in position by two rails at top and bottom. At the sides of the kettle or the ends of the partition somewhat more space is left between the last picket and the side of the tub so that there is more chance for circulation where the liquor is apt to be a little cooler due to increased radiation. This is the exact reverse of the effect obtained with the perforated type (A) where the circulating space on the end is more restricted than at the center, as the amount of perforations is limited to give the necessary strength at the ends of the rack.

Load

The load or poundage of material dyed in a kettle is usually expressed in pounds of goods per foot of length of front of kettle. The load carried varies with



A

B

Fig. 4

weight of fabric, tendency to run in folds and whether acid or union dyeing. In a well-constructed kettle, that is, one that will give proper passage through the machine without strain to the goods or toppling and

with proper steam distribution, it should be possible to color evenly a weight of acid dyed woolen or worsted goods equal to from eighty to ninety-five pounds per foot of front length, depending upon type of machine. A somewhat greater weight of union-dyed goods could be dyed in the same kettle due to the property of cotton dyestuffs coloring level in a short bath.

It is of importance to every dyer that he should know the capacity of all kettles in his dyehouse. This is of even greater interest to the union goods dyer than the acid dyer, as the depth of shade obtained with any formula depends upon the volume of liquor used. It is also necessary to vary the volume if the weight of goods or load is different from the usual standard load. When different sized loads of union goods are to be colored regularly in the same sized kettles, it is a help to use a marked stick to measure the height to which the kettle should be filled for the different regular loads. For a square or rectangular bottomed kettle it is a simple matter to mark the different volumes as the height varies directly with the load. With the semi-cylindrical or curved back type of machine the figuring of the starting level is not as simple but is more important. In the square of rectangular bottomed kettle the volume held by each unit of meas-

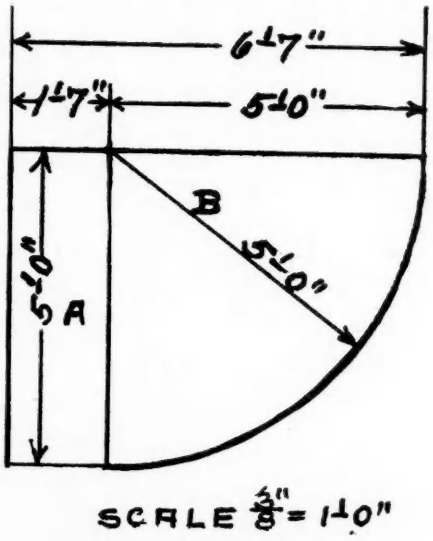
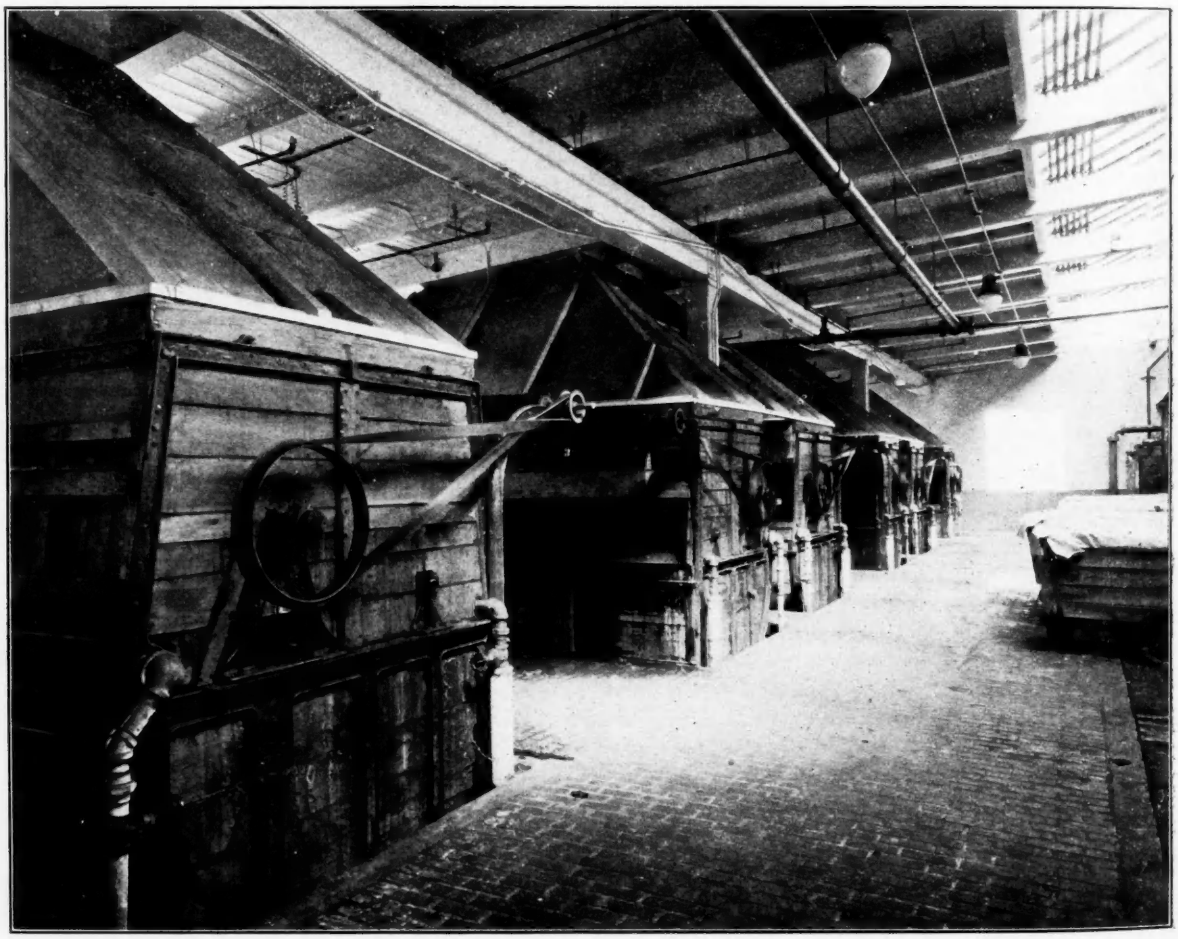


FIG. 5



Courtesy Klauder-Weldon Dyeing Machine Co. FIG. 6

urement in height of level is the same, whereas in the curved bottom it varies greatly. Many dyers, while aware of this fact, neglect to take it into consideration, feeding on extra dyestuff to make up for the error or accepting the resulting off shade.

The writer found it helpful, especially in that he had kettles of three different sizes all dyeing the same goods, to make out a chart showing the different starting levels necessary to obtain the same volumes in the different sized machines. With the use of a marked stick for each size a greater uniformity of shade was more easily obtained than by previous methods.

When the curved back of the kettle is approximately the arc of a circle the following method of determining the volume contained at any level can be used. In Fig. 5 we have a kettle depth of 5 feet, length 7 feet 8 inches, width 6 feet 7 inches, with the back of kettle approximating an arc swung from center point X with radius of 5 feet. We can then divide the area into rectangle A and segment B. For example, if kettle were filled to height of 3 feet,

Volume in U. S. gallons equals
(area rectangle A + area segment B)(length)(7.4805)

or

$$\text{Volume at 3 feet} = \left[3(15833) + \frac{19817(10)^2}{2} \right]$$

$$(7.666)\ 7.4805 = 834 \text{ gallons.}$$

Steam Removal

Most modern dye kettles are built to permit the attachment of steam flue or canopy. Fig. 6 illustrates a battery of boiling kettles in the dyehouse superintended by the writer, showing the absence of steam in the room. The hoods or flues must not cut out too much light nor prevent easy loading and unloading of the machines. In Fig. 6 two machines are each connected with one flue containing a motor-driven fan which draws the steam outside the building. The plug holes or draining outlets of all are piped outside the building, thus preventing any steam escaping when draining hot liquors. As there is no overhead piping of any kind, except for fire extinguisher lines, there is no liability of spots from overhead drip. The results obtained by the use of up-to-date reel dyeing machines properly installed in a modern dyehouse seem to be well worth the expense as well as the study and time required to work out the great number of problems involved.

Victory Dyeing & Finishing Company, Paterson, N. J., has taken out a permit for the erection of a new one-story dye house at 53-55 Wood Street.

Locating Responsibility for Unevenness

Uneven Pressing—Weighting—Effect of Moisture—Scouring

UNEVENNESS, streakiness, cloudiness, are a few of the faults which have been the cause of much personal feeling and will probably be so as long as cloths are dyed. At every perch where dyed goods are seen, or over whatever table, if they should appear in any shape or form uneven, streaky, cloudy or listed, the dyer must toe the line and often explain how he did it! Unlevel colors certainly seem as if the dyer has produced such results; after all, it is the dye which is unlevel, and who but the dyer then is responsible? It is speaking somewhat in the nature of platitudes to attempt to explain how some of these very common faults are produced, and yet they are of much interest to many and they should certainly be of some moment to those who invariably blame the dyer. Quite frequently the dyer is to blame, but not always.

Take the case now of finished pieces, say either woolen or worsted, light or heavyweight, which when finished out look what is commonly termed "cloudy," that is they are not exactly what we should term downright "uneven in color," but there is an unsatisfactory appearance about them. This cloudiness is more prominent in some cases than in others, and there is a whiteness in places which looks very objectionable. How does the dyer explain it? It's put to him first, of course, and he is so used to refuting blame that the first thing he says is that he hasn't done it; and he can bring forth a great deal of evidence which may indicate that there are other places where the fault may have been caused. Probably if the fault had been in the goods before they were finished out, that is immediately after drying, when they were perched for dyers' faults mainly, he would have been acquainted with the fault then, and therefore a finished piece which turns up cloudy may have been made so after dyeing.

Uneven Pressing

Such, indeed, is easily possible, and a fault of this description may have been formed by uneven pressing. Sometimes a piece which has been given an uneven appearance in the pressing is very pronounced, and definitely glazed places are to be seen and the exact cause of the fault at once located; not infrequently old "papers" will produce an uneven or cloudy appearance in this way. The remedy for such a fault is quite a simple one, and by merely wetting-out and refinishing it is overcome.

Very occasionally cropping cylinders go wrong, and a cloudy appearance is thereby given to finished goods. Unless very great and continual care is being exercised throughout a dyeing and finishing works such a fault is not easy to locate, and a greater amount of trouble is involved in putting such faulty pieces right again. It may mean simply a recrop or it may even mean that the goods

will have to be given a slight "raise" and then passed through good machines with perfectly true cylinders.

Uneven Weighting

Immediately after drying pieces sometimes come up uneven, and it certainly looks at first sight as if they are dyers' faults. Lighter weight goods, often of poor quality, are occasionally weighted, and unsatisfactory weighting agents are employed for the purpose, and unless they are thoroughly dissolved or mixed the whiteness of some of the agents may show by their being deposited on the surface of the pieces, giving an uneven or cloudy appearance.

When the fault is very conspicuous, the weighting process will frequently be immediately and rightly blamed, but at times the seat of the trouble is not so easy to detect.

If the weighting bath is not efficiently stirred by the men engaged on the work the cloth may take up the solution or mixing unevenly and give an unevenness which looks like dyeing.

Effect of Moisture

Again in some types of goods it is most surprising, even to those engaged daily in looking for faults in cloths, what a marked effect on the evenness of the material moisture may have. This is particularly the case with heavily-made and dyed cloths, and is probably more a color or dye peculiarity than anything else. Some colors are very susceptible to the action of water or moisture, and even the moisture in the atmosphere will give some strange appearances to certain colors.

It is in such cases as these where the pieces may have appeared perfectly level when they were examined immediately after dyeing and drying, and yet look grossly unlevel on finishing out. It may be that they were damped or dewed or London shrunk, and these processes were not evenly carried out, and thereby left more moisture in some parts of the piece than in others. The same effect may have been produced in the decatizing or dry steaming processes. Moisture gets into the steam to a very varying extent frequently, and goods which are dyed with susceptible colors will readily begin to look uneven after they have passed through these operations. One would naturally blame the dyer for such faults when it is nothing more than varying moisture content.

Another case of unevenness which is produced after dyeing is in the treatment of the heavier classes of worsted and woolen goods. Indigo and the wood colors are often earthed after dyeing on the washer or dolly scouring machine, and by running badly, say in the same folds too long, color is removed from some parts of the material more than in others, since in such cases there is some surface dyeing which takes place apart from actual combination between dye and fiber. Re-earthing may put such faulty goods right if the fault is not too bad.

Again, where goods are weighted, as mentioned above, and the scouring is at fault and soap or fats left in the goods, there may be a combination between the fats (or soap in the case where the goods are not dyed) and some of the constituents of the weighting baths, and cloudiness produced, as a result of the compounds formed on the material.

Scouring, or lack of it, is frequently the cause of cloudiness in dyeing. If the pieces have not been properly scoured some of the original fats may be left in, and it may be impossible to dye them level, while if the soap has not been entirely "cleared," this again may produce an unlevel appearance. If the goods are to be dyed with acid colors a little fat or unwashed out soap may not make a great deal of difference, but if they have to be mordanted, the soap may combine with the mordanting substances being used and give some very delightful effects in the way of "clouds."—Textile Argus.

BRITISH DYE PRICES TO BE REDUCED

Under the provisions of the British Dyestuffs Act, licenses must be issued for all dyes imported into the country. For the past two years no foreign dyes were allowed to enter unless the price asked for the British equivalent was more than two and one-half times the pre-war price for such a color. It is now reported that the British Dyestuffs Licensing Committee has decided to issue licenses for importation of foreign colors when the price asked for the same class of dye by the British maker is only in excess of *double* the pre-war price. This change, which will be effective September 1, 1927, represents a reduction of 20 per cent in the price factor governing the issuance of dyestuff licenses.

British dye manufacturers have announced that the prices of their colors will also be reduced 20 per cent. While the decision of the Dyestuffs Licensing Committee does not, of course, compel the domestic manufacturers to reduce their prices accordingly, it is in effect mandatory upon the makers to do so in order to protect their own trade, for the reduction of the price barrier against foreign colors will undoubtedly result in a distinct increase in imports of foreign dyes if British prices are not correspondingly reduced.

In this connection, according to Trade Commissioner H. S. Fox in a dispatch to the Department of Commerce, it is known that the recent merger of chemical interests in the British Isles has apparently improved the prospects of further reduction in prices of domestic dyes. It is likely that even lower prices than those caused by the licensing reduction will become effective in the near future.

Oneida Bleachery, Inc., New York Mills, N. Y., is now running on full-time weekly schedules, with some additional workers.

Twenty-five Years of the American Dye Industry

Dye Manufacture Prior to the War—The Development of Intermediate Manufacture—Supplying the Demand for Crudes—Solving the Indigo Problem.

By C. G. DERICK

Derick Laboratories, Inc., Chesterton, Ind.

"WITHOUT intention to minimize what has been done before 1882, this analysis (of records of tariff hearings) will show that a real conscious, self-contained industry, dates from then on—that there has been a steady progress for the American dyestuff industry from then until the outbreak of the European War. The logic of events, had there been no European War, would have led to the elimination of existing obstacles and the ultimate creation of a satisfying, self-contained American dyestuff industry. The development in that case would have been in a better sense of proportion, more harmonious, more in line with sound economic maxims, and less hysterical and passionate than under the jerk of a world catastrophe." This pronouncement in 1924 by such an eminent authority and pioneer in the American dye industry, George A. Prochazka, merits serious attention and careful analysis as it appears to challenge much that has been discussed and published since the "jerk" of the 1914 catastrophe.

The last twenty-five years of the American dye industry is divided into two significant periods by the outbreak of the World War. The first period from 1900 to 1914 was of exceptional importance. At its very outset (1901), the Schoellkopf, Hartford & Hanna Company, of Buffalo, obtained patents for the successful processes for the manufacture of direct blacks (Schultz 462 and 463.) These products were first patented by Dr. O. Muller, but it remained for the scientists, Drs. Richard Taggesell, Rempacker and E. Culmann, under the executive leadership of J. F. and Hugo Schoellkopf, of the Buffalo firm, to develop the commercially successful Erie direct blacks, the most important, financially, of all the direct dyes. This accomplishment was a magnificent proof to the world of the existence of this "real conscious, self-contained industry" in America, proclaimed nearly fifty years ago by experts like George A. Prochazka.

Dye Manufacture Prior to the War

Of great significance to the expansion of the American dye industry during the war was the fact that during this period from 1900 to 1914 a group of younger scientists was being trained in the art of dye and intermediate manufacture at the Buffalo concern in particular. Their accumulated experience had already resulted in the permanent manufacture of the list of Buffalo products mentioned by Norton in his dyestuff census for the fiscal year 1914. Thus Dr. W. J. Stanton was manufacturing chrome and acid colors; Dr. Edward Ruppert fuchsine and alkali blues; A. S. Holland, oil colors, and Dr. J. F. Schoellkopf, Jr., nigrosines.

One notable American Buffalo concern played an important role in which the development was certified colors. This work at Buffalo was carried out by Willard H. Watkins and Alfred Holland. The Kohnstamm concern were also pioneers in the production of certified colors.

The name of Heller & Merz as producers of dyes for the paper industry was firmly established. Just prior to the war the W. Beckers Aniline & Chemical Works, Inc., were establishing themselves, specializing in alizarin substitutes.

It has been generally stated that the American dye industry, previous to the war, simply assembled foreign intermediates into dyes. Just previous to 1884, the Buffalo firm "were producing coal-tar distillates, aniline oil and a few important dyes. Research work had also progressed to the stage that permitted them to patent several processes for the manufacture of important intermediates and dyes. The process for one of these intermediates was the foundation for the development of a considerable number of very important dyes brought out in Germany. The Schoellkopf works, however, drew royalties on the utilization of their patented processes," says Willard H. Watkins. The tariff revision of 1884 did away with the specific duty on coal-tar dyes and made radical changes in policies, causing this and all other American companies, for the most part, to cease the manufacture of intermediates, in favor of German imported products. Dr. Watkins says further, "At all times, however, the officers of the company (Schoellkopf) were alive to the importance of carrying on their own manufacture of these products. The manufacture of no intermediate that could be produced at anything approaching the cost of importation was ever discontinued. Some few important intermediates were always made by this company, such as sulphanilic and metanilic acids, toluidine sulphonic acid, naphthionic acid and

Neville & Winther's acid. Other important intermediates, such as H-acid, had been made but necessarily discontinued. Others had been studied from the chemical side. *A corps of capable chemists considerably larger than ordinary operation demanded, was always maintained."*

The year 1910 saw the birth of a successful attack upon the foreign monopoly in basic intermediates more closely related to the coal-tar distillates, which meant gradually complete economic freedom for the American dye industry from crudes to finished dyes and fine organic chemicals. Economic conditions had so changed by this date that the manufacture of aniline (nitrobenzol) was begun jointly by the General Chemical Company, the Semet-Solvay Company and the Barrett Company at the latter's plant at Frankford, Pa. A. B. Mitchell was brought over from England to operate the plant, having had experience in the Barnes plant in England. He was assisted by A. G. Peterkin, Jr.

The year 1913 saw a production of 2,000,000 pounds. But domestic demands caused the immediate erection of the plant of Benzol Products Company at Marcus Hook, Pa., under the supervision of A. B. Mitchell and F. W. Barker, Jr., who operated during the war, together with with H. B. Bishop and others. It was a short step to nitrotoluols, toluidines, xylidines, aromatic diamines, etc., once the manufacture of aniline was firmly established. The manufacture of aromatic amines upon a sound economic basis was one of the most important pre-war accomplishments and fittingly closed this tremendously productive period of the American dye industry, 1900 until the outbreak of the World War in 1914.

Development of Intermediate Manufacture

But now to the "hysterical and passionate" period "under the jerk of a world catastrophe." This second period from the outbreak of the war to date was peculiarly the period in which intermediates and crudes were developed and manufactured in America. It is outstandingly the period of chemical engineering development. On the chemical side it was largely a problem of expanding the scientific personnel experienced in the art of dye making. Raw technically trained recruits were hastily assembled. If experienced leadership was available, conservative progress resulted with relatively small financial waste. If no experienced leadership was available, the losses of single firms ran into the millions. But what a glorious time the chemists and engineers had while the money lasted! America will always be the richer for having had the opportunity to spend in the dye industry without counting the cost at the moment.

Of first importance during this period was the immediate establishment of comprehensive research organizations as that of the Barrett Company, led by J. M. Weiss; of the Semet-Solvay Company, by Dr. L. C. Jones; of the Du Pont Company, by C. L. Reese; of the Newport Company, by Dr. I. Gublemann; of the Color Laboratory, Department of Agriculture, by H. D. Gibbs, and of the Schoellkopf Company, by C. G. Derick. These research departments were the organized training schools for the expanding technical personnel and their products in terms of human scientific brains offset the terrible mauling the industry received during recent years at the hands of certain financial interests.

The disintegration of nearly all of these comprehensive research organizations is the most severe blow that recent years has dealt this industry. To-day we are again largely a "nation of leaners" as far as this industry is concerned, to use the expression of Farrell.

The manufacture of aromatic nitro compounds and amines so ably established by the Benzol Products Company during the first period was madly duplicated by many in the second period, with the resulting waste of enormous amounts of capital, and the only benefit accruing to the technical staffs and the manufacturer of equipment. What is true of these bulk basic intermediates was true on a smaller scale for nearly every intermediate. A single plant was erected with capacity to manufacture the world demands for beta naphthol, but this was not enough. It was duplicated at dozens of points in this United States. The familiar financial crashes in the industry during recent years was inevitable. But if this situation was true for the intermediates where some hesitation was forced upon one due to the large investment demanded in equipment, no such deterent existed in the case of the dyes. The single company at Buffalo made nearly 75 per cent of the consumption of this country and Canada in the early part of the period and had capacity to make the entire normal demands of this country in most lines. The high mortality of dyestuff companies since 1918 is a cruel witness to the situation. However, results of lasting value are inevitable from such an opportunity, no matter how badly it is handled.

Supplying the Demand for Crudes

The emergency demands of the war for toluol soon solved the question of a permanent supply of these lighter coal-tar crudes, as by-product coke ovens began rapidly increasing and the automotive industry to absorb almost limitless quantities of surplus. The domestic demands had already assured the permanent supply of naphthalene and phenol. Anthracene presented a much more difficult problem and one that is not necessarily settled at this writing. The demand for anthracene has temporarily ceased, due to the synthesis of anthraquinone from phthalic anhydride and benzol.

One of the outstanding accomplishments of this

period was the catalytic synthesis of phthalic anhydride by Gibbs and his associates of the Color Laboratory at Washington. No one could foresee the present enormous production of this intermediate nor its present price, relatively below that of the pre-war days. It made possible American vat dyes and synthetic solvents and plasticizers for the lacquer and synthetic resin industries. Its influence upon the method of manufacture of Indigo is hidden in the future. It is peculiarly fitting that it should be the result of research sponsored by our Federal Government.

The Benzol Products Company, early in this period, expanded its production to include that of ortho and para nitrotoluol and the corresponding toluidines and similar products. Simultaneous development in these lines occurred at the Atlantic Dyestuff Corporation under the leadership of J. Nachsatz and O. Smith, at the Newport Chemical Works, Inc., under Dr. A. J. Weiland, W. V. Wirth, P. Hand and C. N. Davidson, and at the Du Pont Company. Many other nitro aromatic derivatives and amines were developed by the same organizations.

Chlorbenzol as a starting point for the manufacture of intermediates and dyes was early recognized as possessing peculiar advantages to the American dye industry. The development of the processes for the manufacture of this very important basic intermediate was early accomplished by the Niagara Alkali Company and by the Hooker Electrochemical Company.

The unexpected result that the original waste dichlorbenzol had many commercial uses as a spray and deodorant, illustrates one of the unexpected economic changes in this field and is occurring with such frequency in the American dye industry as to completely upset pre-war production and prices in such lines.

Using the basic intermediate, chlorbenzol, as the starting point, the Schoellkopf concern developed the manufacturing processes for ortho nitroanisol, ortho and para anisidin, and dianisidine, under the leadership of C. G. Derick, D. W. Bissell, R. A. Nelson and others.

Accordingly, the development by the Barrett Company of nitro naphthalene and alpha naphthylamine under the leadership of A. G. Peterkin, Jr., S. P. Miller, W. B. Murphy and their assistants was a welcome aid to the expanding industry. This development was soon duplicated by the Newport Chemical Works, Inc., and others.

Early in 1915 some dye concerns were manufacturing their own beta naphthol and others rapidly took up its manufacture. With the appearance of the production of Calco Chemical Company and its insistence upon the sound economic policy that certain intermediates could be manufactured at one plant in bulk much cheaper than by dozen small competitors, the wiser and experienced dye manufacturers ceased the manufacture of beta naphthol.

The Dow Chemical Company, under the leadership of Herbert H. Dow, one of America's foremost chemical pioneers, attacked the problem of Indigo. Indigo is used to the greatest extent of any single dye in America. January, 1917, witnessed the first sales of this production and ever since, Dow Indigo has maintained a prominent position in the world market. For during this year production was started by National Aniline & Chemical Company, Inc., and E. I. du Pont de Nemours & Co., and competition has been so keen that to-day Indigo is selling at a price relatively lower that at any time in the history of the dye industry. About this product is woven the demonstration that the United States can hold its own in world competition in the dye industry, in certain lines at least.

Another gap in the complete line of American dyes was the sulphur colors. Early in 1916, under the leadership of Dr. J. F. Schoellkopf, Jr., the Buffalo concern put into operation a modern plant for the production of Sulphur Black, the second most extensively used dye in America. By the end of 1917, twenty-one firms were reported as manufacturing this single dye. The product of Atlantic Dyestuffs Company produced under the leadership of G. Rackely, held a prominent position.

Alizarin was produced by National Aniline early in 1918 under the direction of the late E. G. Griffin. The process was developed by the Barrett research staff and much credit is due J. M. Weiss and Dr. C. R. Downs. Progress has been made in the field of alizarines by the above concern and Beaver Chemical Corporation, yet much remains to be done to complete this phase of the American dye industry.

One of the last branches of the American dye industry to be developed was the vat dyes. Experimental manufacture of important dyes of this group had occurred in 1918 by certain firms, some of whom hesitated to start regular production despite the fact that this was the latest field of world dye development, thus offering the greatest chances of discovery and patent monopoly. Little did these concerns realize that new trade demands just a few years ahead would rapidly increase the demands for these dyes and that to-day their importance would be many times greater than in 1914. This lack of foresight and belief in productive research marks the turning point in the relative importance of certain dye concerns in America. The Du Pont Company, under the able scientific leadership of Doctors Stine and Bolton and their associates, during the last few years has steadily increased in importance with its well known appreciation of the relation of research to industry, although it did not enjoy the years of pre-war experience that was the heritage of certain other concerns. To this company and the Newport Chemical Company, under the leadership of W. M. Murch and M. T. Coakley, is due the main credit for supplying America with a domestic production of vat dyes. The work is still incomplete.—Chemical and Metallurgical Engineering

Dyes Imported Through New York and Other Ports During June

Compiled by the Chemical Division of the Bureau of Foreign and Domestic Commerce in Collaboration with the Chemical Division of the United States Tariff Commission

KEY TO ABBREVIATIONS OF MANUFACTURERS' NAMES

1—THE SIX LEADING GERMAN COMPANIES

IG—Interessen-Gemeinschaft der Farbenindustrie.
A—Actien-Gesellschaft fur Anilin-Fabrikation, Berlin. Founded 1873.
B—Badische Anilin-und-Soda-Fabrik, Ludwigshafen-on-the-Rhine. Founded 1865.
By—Farbenfabriken, vormals Friedr. Bayer & Co., Leverkusen-on-the-Rhine. Founded 1862.
C—Leopold Cassella & Co., Frankfort-on-the-Main. Founded 1870.
K—Kalle & Co., A. G., Biebrich-on-the-Rhine. Founded 1870.
M—Farbwerke, vormals Meister Lucius & Bruning, Hochst-on-the Main. Founded 1862.

2—THE SMALLER GERMAN COMPANIES

BK—Leipziger Anilinfabrik Boyer & Kegel, Furstenberg, near Leipzig. Founded 1882.
CG—Chemikaliewerk Griesheim G. m. b. H., Griesheim-on-the-Main. Founded 1882.
CJ—Carl Jager G. m. b. H., Anilinfarbenfabrik, Dusseldorf. Founded 1823
GrE—Chemische Fabrik Griesheim-Electron, Offenbach-on-the-Main. Founded 1842.
L—Farbwerk Mulheim, vormals A. Leonhardt & Co., Mulheim-on-the-Main. Founded 1879
Seig.—G. Seigle Corporation, Stuttgart.
tM—Chemische Fabriken, vormals Weiler ter Meer, Uerdingen-on-the-Rhine. Founded 1877.
WD—Wulfing, Dahl & Co., A. G. Barmen. Founded 1842.

3—SWISS COMPANIES (ALL AT BASEL)

DH—Farbwerke vormals L. Durand, Huguenin & Co. Founded 1871.
G—Anilinfarben-und Extract-Fabriken, vormals Joh. Rud. Geigy. Founded 1764.
I—Gesellschaft fur chemische Industrie. Founded 1885.
S—Chemische Fabrik, vormals Sandoz & Co. Founded 1887.

4—DUTCH AND FRENCH COMPANIES

FA—Farbwerk Ammersfoort, Ammersfoort, Netherlands. Founded 1888
NF—Niederlandische Farben-und-Chemikalienfabrik Delft, Delft, Netherlands. Founded 1897.
CN—Compagnie Nationale de Matieres Colorantes et Produits Chimiques. Founded 1917. (Etablissements Kuhlmann merged with this company in 1923.)
P—Societe Anonyme des Matieres Colorantes et Produits Chimiques St. Denis (formerly A. Poirrier). Founded 1830.

5—ENGLISH COMPANIES

Bro—Brotherton & Co., Ltd., City Chambers, Leeds.
BAC—British Alizarine Co., Ltd., Manchester
BD—British Dyestuffs Corporation, Ltd., London.
Cl Co.—The Clayton Aniline Co., Ltd., Clayton, Manchester.
CV—The Colne Vale Dye & Chemical Co., Ltd., Milnsbridge, Huddersfield.
Hol—L. B. Holliday & Co., Ltd., Huddersfield.
Scot—Scottish Dyes, Ltd., Grangemouth.

IMPORTS of foreign dyes entering through the port of New York and other ports during the month of June totaled 318,450 pounds, with an invoice value of $253,054. Imports by ports were as follows: New York, 309,720 pounds, valued at $246,417; Albany, 6,628 pounds, valued at $5,007; Boston, 2,102 pounds, valued at $1,630.

Dyes and Intermediates Remaining in Bonded Customs Warehouse

	Dyes and Colors (pounds)	Intermediates (pounds)
December 31, 1926	360,488	562,536
January 31, 1927	615,542	647,692
February 28, 1927	896,059	719,055
March 31, 1927	869,963	712,617
April 30, 1927	1,125,983	827,260
May 31, 1927	1,065,143	813,137

Five Leading Dyes, by Quantity, Imported During June

	Pounds
Helindone Printing Black RD Paste	10,500
Indanthrene Blue GCD (single strength)	8,296
Brilliant Indigo 4B Paste	7,168
Alizarin, synthetic	7,056
Vat Red Violet RH (single strength)	7,025

Imports of Synthetic Dyes

	Pounds	Invoice Value
1927—		
January	196,620	$186,387
February	312,277	262,364
March	404,714	352,414
April	402,783	323,732
May	349,476	265,752
June	318,450	253,054
Total (six months)	1,984,320	$1,643,703
1926—		
January	300,441	$283,635
February	369,045	377,638
March	487,804	435,891
April	437,526	401,606
May	392,739	343,745
June	333,319	317,896
Total (six months)	2,320,874	$2,160,411

Per Cent of Dyes by Country of Shipment

	June 1927	June 1926	Jan.-June 1927	Jan.-June 1926
Germany	68.0	51.5	55.08	48.50
Switzerland	17.0	36.0	26.32	36.17
France	4.5	1.0	3.63	3.83
England	1.0	7.5	4.60	4.58
Belgium	5.0	3.0	5.82	3.92
Canada	1.5	0.5	2.47	0.92
Italy	3.0	0.5	1.96	1.58
Netherlands	—	—	0.12	0.50

The dyes in this report are grouped by both Colour Index and Schultz numbers, and, in the case of those which could not be identified by either number, the classification according to the ordinary method of application was adopted. As the pastes and powders of the vat dyes vary widely in strength and quantity, each vat dye has been reduced—in nearly every case—to a single strength basis.

DYES OF COAL-TAR ORIGIN

Col. Index No.	Schultz No.	Name of Dye and Mfr.	Quantity (pounds)
40	58	Chrome Orange R—(DH)	110
44	56	Nitrosamine Red Paste—(IG)	500
54	64	Sorrel Red X—(IG)	500
70	—	Rapid Fast Red GL Paste—(IG)	4,000
80	83	Ponceau 3R—(Q)	22
105	88	Acid Anthracene Brown R—(IG)	100
127	118	Brilliant Geranine B—(IG) Geranine G—(By)	300
145	140	Jasmine High Conc.—(G)	1,102
172	159	Acid Alizarine Black R—(IG)	500
219	—	Eriochrome Flavine A Conc.—(G)	1,102
246	217	Alaska Black 10BX—(IG)	75
252	227	Cotton Scarlet Extra—(IG)	50
256	230	Cloth Red 3G Extra—(IG)	25
307	265	Acid Milling Black B—(G)	2,205
316	273	Diazamine Blue BR Conc.—(S)	264
319	—	Benzo Fast Heliotrope 2RL—(IG)	250
324	—	Developed Brilliant Orange GR Ex.—(By)	1,111
325	—	Diamine Fast Violet FFBN—(IG)	300
326	279	Benzo Fast Orange S—(IG) Benzo Fast Orange WS—(IG) Benzo Fast Scarlet 8BS—(IG)	300
357	300	Brilliant Carmine L Conc—(IG)	100
369	314	Ignamine Orange 2R—(IG)	100
403	—	Chlorantine Fast Gray B—(I)	1,323
430	—	Polar Red R Conc.—(G)	2,205
436	358	Chloramine Brilliant Red 8B Conc.—(S) Chloramine Red 8BS—(By)	1,463
440	360	Ignamine Orange R—(IG)	250
441	—	Chrome Fast Yellow RD Powder—(IG)	300
448	363	Cotton Red 4BX—(IG)	500
459	373	Congo Orange R—(IG)	600
538	—	Oxydiamine Black N—(IG)	500
544	—	Diamine Jet Black SS—(IG)	500
561	449	Trisulphon Brown B Conc.—(S)	5,000
594	475	Diamine Dark Green N—(IG)	100
597	—	Benzo Chrome Brown R—(IG)	50
636	19	Fast Light Yellow 2G—(IG)	507
639	22	Xylene Light Yellow 2G—(S)	1,200
645	—	Kiton Fast Yellow 3G—(I)	551
649	26	Triazogene Orange R—(IG)	200
654	—	Diazo Fast Yellow 2G—(By)	500
658	496	Rhoduline Blue 6G—(IG)	200
663	500	Setopaline Conc.—(G)	220
667	503	Brilliant Milling Green B Conc.—(C) Poseidon Green SGX—(IG)	560
670	505	Acid Green Conc. Powder—(M)	229
677	512	Magenta AB Powder—(IG)	900
680	515	Methyl Violet NFB—(IG) Methyl Violet 300 XE Extra Conc.—(SLD)	3,110
681	516	Crystal Violet Extra Powder—(IG)	200
682	518	Ethyl Violet—(IG)	1,600
690	522	Victoria Blue 4R Highly Conc.—(IG)	500
691	523	Fast Green Extra Bluish—(By)	551
707	539	Soluble Blue T—(IG) Water Blue Large Lumps—(IG)	650
710	541	Brilliant Sky Blue 5G—(IG)	100
712	543	Patent Blue V—(IG)	1,000
714	545	Brilliant Acid Blue A—(IG) Patent Blue A—(IG) Poseidon Blue BR Conc.—(IG) Poseidon Blue BR Extra—(IG) Poseidon Blue BXX—(IG)	4,100
715	546	Blue Extra—(IG) Blue FF—(C) Blue FF—(IG) Xylene Cyanol FF Extra Conc.—(S)	1,580
717	548	Acid Violet 6 BNOO—(B)	310
720	551	Eriochrome Azurol BC—(G)	2,205
727	557	Chrome Violet CG—(DH)	110
729	559	Basic Pure Blue BO—(B) Victoria Blue B Highly Conc.—(IG) Victoria Pure Blue BO—(IG)	2,751
733	562	Intensive Blue B Powder—(By)	110
735	564	Alkali Fast Green 3G—(IG) Erio Green B Supra—(G)	1,602
748	579	Sulpho Rhodamine B Extra—(IG)	100
749	573	Rhodamine B Extra (s. s.)—(IG) Rhodamine B Extra (s. s.)—(Q)	6,350
753	576	Irisamine G—(IG)	50
756	581	Fast Acid Eosine G—(IG)	25
758	582	Fast Acid Violet R—(IG)	100
773	592	Erythrosine—(Q)	22
789	—	Patent Phosphine G—(I)	220
793	606	Phosphine 3R—(IG)	1,764
795	607	Runic AL Conc.—(IG)	1,000
797	608	Patent Phosphine GRNTN—(IG)	2,000
814	617	Chloramine Yellow FF—(IG)	100
815	618	Basic Yellow T—(IG) Basic Yellow TCN—(IG) Rhoduline Yellow 6G—(IG)	1,000
828	672	Azo Carmine GX—(IG)	350
829	673	Rosinduline 2B Bluish—(K)	378
833	—	Wool Fast Blue BL Powder—(By) Wool Fast Blue GL—(IG)	1,798
842	680	Methylene Violet 3RA Extra—(IG)	250
865	700	Silver Gray P—(IG) Nigrosine T—(IG)	400
875	923	Furrol Gray G—(IG)	22
879	—	Chrome Azurine G Powder—(I)	220
884	627	Gallo Navy Blue S Conc. Paste—(IG)	200
888	631	Chromocyanine BC Paste—(DH)	514
892	635	Blue 1900 TCD—(DH) Modern Violet—(DH)	1,102
904	643	Phenocyanine TV—(DH)	11
908	648	Fluorescent Blue—(S)	10

Col. Index No.	Schultz No.	Name of Dye and Mfr.	Quantity (pounds)
913	653	Danubia Blue BX—(IG)	250
922	659	Methylene Blue No. 335—(Q)	1
		Methylene Blue NS Conc.—(S)	500
927	663	New Methylene Blue N—(IG)	500
969	748	Hydron Blue R Powder (s. s.)—(IG)	2,667
1006	746	Pyrogene Green 3G—(I)	551
1019	774	Alizarine Black S Paste—(IG)	952
1027	778	Alizarine VI Old—(IG)	
		Alizarine Red VI Extra Pure—(IG)	7,056
1033	779	Alizarine Orange A Paste—(IG)	1,000
1034	780	Alizarine Red S Powder—(IG)	
		Alizarine Red S Powder—(Q)	
		Alizarine Red SW—(I)	1,168
1040	784	Alizarine Red SX Extra Paste—(IG)	
		Alizarine Red WR Paste—(IG)	1,323
1051	799	Alizarine Cyanine GG Powder—(By)	507
1060	801	Anthracene Blue SWGG Powder—(B)	300
1063	790	Anthracene Blue SWR Powder—(IG)	500
1064	—	Alizarine Cyclamine R Paste—(IG)	397
1067	804	Alizarine Blue S Powder—(IG)	1,000
1071	808	Alizarine Green S Paste—(IG)	
		Alizarine Green S Paste—(BDC)	1,493
1073	852	Alizarine Irisol R Powder—(IG)	286
1075	856	Alizarine Blue AS—(By)	110
1076	859	Alizarine Direct Blue RXO—(IG)	100
1078	865	Alizarine Cyanine Green G Extra—(By)	
		Alizarine Cyanine Green 3G Powder—(IG)	789
1080	853	Special Violet B—(IG)	350
1081	864	Anthraquinone Green GXNO Powder—(IG)	200
1082	863	Anthraquinone Blue Green BXO—(IG)	100
1083	854	Brilliant Alizarine Viridine F Paste—(DH)	55
1084	854	Alizarine Viridine FF Paste—(DH)	
		Alizarine Viridine FF Paste—(IG)	4,454
1085	862	Alizarine Blue Black B Powder—(IG)	1,200
1088	855	Alizarine Sky Blue B—(By)	
		Alizarine Sky Blue B—(IG)	1,051
1092	—	Alizarine Geranol B Powder—(IG)	750
1095	759	Anthra Yellow GC Paste—(IG)	
		Anthra Yellow GC Dbl. Paste (s. s.)—(B)	
		Anthra Yellow GC Powder (s. s.)—(B)	
		Anthra Yellow GC Powder (s. s.)—(IG)	6,320
1096	760	Vat Golden Orange G Dbl. Pst. (s. s.)—(IG)	
		Vat Golden Orange G Powder (s. s.)—(IG)	1,374
1097	761	Vat Orange RRT Paste—(B)	
		Vat Orange RRT Paste Fine—(IG)	4,478
1099	763	Vat Dark Blue BOA Paste—(B)	
		Vat Dark Blue BOA Powder (s. s.)—(IG)	1,071
1102	765	Vat Black BB Double Paste (s. s.)—(B)	
		Vat Black BB Dbl. Pst. Fine (s. s.)—(IG)	
		Vat Black BB Powder (s. s.)—(IG)	5,359
1103	766	Vat Violet R Extra Powder (s. s.)—(IG)	80
1105	768	Vat Violet B Paste—(IG)	100
1110	841	Vat Blue GGSZ Dbl. Pst. (s. s.)—(IG)	1,000
1113	842	Vat Blue GCD Double Paste (s. s.)—(IG)	
		Vat Blue GCD Dbl. Pst. Fine (s. s.)—(IG)	
		Vat Blue GCDN Powder (s. s.)—(IG)	8,296
1114	—	Vat Blue BCS Powder (s. s.)—(B)	2,835
1115	843	Cibanone Blue G Powder—(I)	110
1116	847	Vat Green BB Paste—(By)	
		Vat Green BB Powder (s. s.)—(IG)	1,997
1118	849	Sandothrene Yellow BG Dbl. Pst. (s. s.)—(S)	
		Vat Yellow G Double Paste (s. s.)—(IG)	
		Vat Yellow G Dbl. Pst. Fine (s. s.)—(IG)	
		Vat Yellow G Powder (s. s.)—(IG)	5,768
1128	818	Algol Pink R Powder (s. s.)—(IG)	800
1132	817	Vat Yellow GK Powder (s. s.)—(IG)	
		Vat Yellow GK Powder (s. s.)—(By)	2,560
1133	819	Algol Red FF Extra Paste—(By)	
		Algol Red FF Extra Powder (s. s.)—(By)	
		Algol Red R Extra Powder (s. s.)—(IG)	4,000
1135	820	Vat Brilliant Violet RK Paste—(B)	
		Vat Brilliant Violet RK Powder (s. s.)—(IG)	2,261
1136	822	Vat Orange RRK Powder (s. s.)—(IG)	400
1137	824	Grelanone Orange R Paste—(GrE)	798
1142	830	Anthra Red RT Powder (s. s.)—(B)	968
1143	827	Anthra Claret R Powder (s. s.)—(IG)	800
1145	834	Vat Gray GK Paste—(IG)	400
1150	—	Vat Olive B Paste—(GrE)	
		Grelanone Olive B Powder (s. s.)—(GrE)	2,069
1151	—	Grelanone Brown RR Paste—(GrE)	
		Vat Brown R Paste—(IG)	
		Vat Brown R Powder (s. s.)—(IG)	5,608
1152	—	Vat Brown B Paste—(GrE)	
		Vat Brown G Paste—(IG)	1,398
1162	831	Vat Red RK Paste Fine—(B)	
		Vat Red RK Powder (s. s.)—(IG)	2,148
1163	832	Vat Violet BN Paste—(IG)	
		Vat Violet BN Paste Fine—(B)	2,429
1172	794	Cibanone Black B Powder (s. s.)—(I)	1,760
1178	876	Indigosol O—(By)	200
1184	881	Brilliant Indigo 4B Paste Fine—(IG)	7,168
1188	884	Brilliant Indigo BB Paste—(IG)	522
1190	885	Brilliant Indigo B Paste—(IG)	4,866
1202	893	Alizarine Indigo G Paste—(IG)	1,985
1207	912	Anthra Red B Paste Fine—(IG)	957
1211	910	Helindone Pink AN Paste—(IG)	
		Helindone Pink AN Powder (s. s.)—(IG)	
		Helindone Pink BN Paste—(IG)	
		Helindone Pink BN Powder (s. s.)—(IG)	2,500
1212	918	Thioindigo Red 3B Paste—(K)	
		Vat Red Violet RH Paste Fine—(IG)	
		Vat Red Violet RH Powder (s. s.)—(IG)	7,025
1213	921	Vat Gray 6B Powder (s. s.)—(IG)	125
1217	913	Helindone Orange R Powder (s. s.)—(IG)	500
1219	920	Helindone Violet R Paste—(IG)	100
1227	904	Helindone Brown G Paste—(IG)	1,000
1228	907	Anthra Scarlet 2G Paste—(B)	
		Anthra Scarlet 2G Paste Fine—(IG)	
		Thioindigo Scarlet 2G Paste—(IG)	4,382

UNIDENTIFIED DYES

Acid Dyes

Name of Dye and Manufacturer	Quantity (pounds)
Acid Black 2R—(IG)	5,000
Acid Brown RN—(G)	220
Acid Violet 8B Extra—(IG)	100
Acid Violet R Extra—(IG)	100
Alizarin Direct Red 3G—(M)	220
Alizarine Light Blue LR Conc.—(S)	500
Alkali Fast Green 10G—(IG)	300
Alphanol Brown B—(IG)	100
Amido Fast Red 2G—(IG)	300
Benzyl Fast Blue 3GL—(I)	220
Brilliant Acid Blue FF—(By)	658
Brilliant Benzyl Violet 3B—(I)	110
Brilliant Milling Blue B—(IG)	1,050
Brilliant Milling Blue FG—(IG)	100
Brilliant Wool Blue B Extra—(IG)	100

Name of Dye and Manufacturer	Quantity (pounds)
Brilliant Wool Blue FFB Extra—(IG)	50
Brilliant Wool Blue FFR Extra—(By)	1,571
Cloth Fast Brown 5R—(I)	330
Cloth Fast Yellow G—(I)	550
Fluorescent Violet B Conc.—(IG)	15
Guinea Fast Green B—(IG)	100
Guinea Rubine 4R—(IG)	100
Indocyanine FF—(IG)	100
Kiton Fast Red R—(I)	441
Metanil Red 3B Extra—(IG)	200
Milling Yellow 3G—(IG)	200
Milling Yellow H3G—(IG)	25
Milling Yellow O—(IG)	500
Neolan Orange R—(I)	220
Neolan Violet B—(I)	220
Neolan Yellow R—(I)	110
Novazol Acid Blue BL Supra—(G)	55
Pilatus Fast Blue BR—(IG)	200
Pilatus Fast Blue GG—(IG)	200
Pilatus Fast Green BL Conc.—(IG)	300
Pilatus Fast Red R—(IG)	200
Pilatus Fast Yellow G—(IG)	200
Pilatus Fast Yellow GR—(IG)	100
Polar Brilliant Red B Conc.—(G)	55
Polar Gray—(G)	441
Selan Printing Brown 3R—(IG)	200
Silk Yellow R—(IG)	300
Sulpho Rhodamine G—(M)	150
Sulphon Orange G—(IG)	300
Sulphon Yellow 5G—(IG)	100
Supramine Black BR—(IG)	150
Supramine Blue R—(IG)	100
Supramine Red B—(IG)	200
Supramine Yellow R—(IG)	100
Wool Fast Orange G—(By)	441
Xylene Brilliant Blue FFRX Conc.—(S)	495

Vat Dyes

Alizarine Indigo 5R Paste—(IG)	600
Anthra Pink B Extra Paste—(IG)	3,500
Anthra Scarlet B Powder (s. s.)—(IG)	1,200
Ciba Pink BG Paste—(I)	441
Cibanone Orange 6R Paste—(I)	110
Cibanone Red G Powder (s. s.)—(I)	1,100
Eridan Brilliant Scarlet B Paste—(IG)	300
Grelanone Red 2B Paste—(IG)	280
Grelanone Red 3BR Paste—(GrE)	276
Helindone Printing Black RD Paste—(IG)	10,500
Hydron Brown G Paste—(IG)	
Hydron Brown G Paste—(C)	1,358
Hydron Brown R Paste—(IG)	816
Hydron Olive GN Paste—(IG)	397
Hydron Pink FF Paste—(IG)	
Hydron Pink FF Powder (s. s.)—(IG)	1,600
Hydron Violet B Powder (s. s.)—(IG)	125
Hydron Violet RF Paste Highly Conc.—(IG)	250
Hydron Yellow NF Paste—(IG)	500
Indigosol O4B—(DH)	220
Indigosol Pink HR Extra—(IG)	59
Indigosol Scarlet HB—(IG)	
Indigosol Scarlet HB—(DH)	80
Indigosol Yellow HCG—(IG)	125
Paradone Direct Black RBP Paste—(LBH)	200
Paradone Direct Black BG Paste—(LBH)	400
Vat Black BGA Double Paste (s. s.)—(IG)	1,692
Vat Blue RSN Powder—(IG)	75
Vat Brilliant Blue R Powder (s. s.)—(IG)	400
Vat Brilliant Orange RK Paste—(IG)	150
Vat Brilliant Orange RK Powder—(IG)	25
Vat Brown GG Paste—(IG)	
Vat Brown GG Powder (s. s.)—(IG)	
Vat Brown GG Powder (s. s.)—(B)	4,600
Vat Golden Orange 3G Paste—(IG)	1,191
Vat Golden Yellow GK Double Paste Fine (s. s.)—(IG)	1,000
Vat Gray RRH Double Paste (s. s.)—(IG)	734
Vat Green GG Double Paste (s. s.)—(IG)	
Vat Green GG Double Paste Fine (s. s.)—(B)	3,978
Vat Khaki GG Paste—(IG)	480
Vat Orange RRTS Powder (s. s.)—(IG)	500
Vat Orange 4R Powder (s. s.)—(IG)	1,000
Vat Pink B Powder (s. s.)—(IG)	750
Vat Printing Brown R Paste—(By)	1,260
Vat Red 2G Paste—(B)	391
Vat Red Brown R Paste—(B)	470
Vat Yellow GPO Powder—(IG)	500
Vat Yellow 3GF Powder—(IG)	25
Vat Yellow 3RT Conc. Powder (s. s.)—(IG)	500

Mordant and Chrome Dyes

Acid Alizarine Gray G—(IG)	685
Acid Anthracene Brown PG—(By)	400
Acid Chrome Yellow RL Extra—(By)	899
Alizarine Claret Red R Paste—(IG)	500
Alizarine Cyanine Green 5G—(IG)	100
Alizarine Fast Gray 2BL Powder—(IG)	472
Alizarine Fast Light Brown GL—(By)	100
Alizarine Yellow RFS—(DH)	55
Anthracene Chromate Brown EB—(IG)	1,000
Autochrome Gray G—(M)	441
Brilliant Chrome Blue S—(DH)	110
Brilliant Chrome Violet 3R, 3RA—(DH)	330
Brilliant Chrome Printing Red B—(G)	110
Chrome Corinth L Conc.—(DH)	110
Chrome Deep Brown RRN—(DH)	110
Chrome Fast Orange RD Powder—(By)	100
Chrome Green GR—(DH)	55
Chrome Printing Red Y—(DH)	110
Chromoxane Brown 5R—(IG)	25
Erio Anthracene Brown R—(G)	220
Eriochrome Brown SWN Supra—(G)	220
Eriochrome Red G—(G)	1,102
Metachrome Blue Black 2BX—(A)	1,102
Metachrome Brilliant Blue BL—(IG)	100
Modern Black N—(DH)	110
Modern Olive JN—(DH)	110
Salicine Orange 2R—(IG)	100
Ultra Cyanol B—(S)	1,000

Direct Dyes

Benzo Fast Black L—(IG)	300
Benzo Fast Blue 8GL—(IG)	725
Benzo Fast Bordeaux 6BL—(IG)	400
Benzo Fast Brown 3GL—(IG)	1,000
Benzo Fast Brown RL—(IG)	1,100
Benzo Fast Orange 2RL—(IG)	200
Benzo Fast Yellow RL—(IG)	500
Benzo Red 12B—(By)	100
Benzo Rhoduline Red B—(IG)	150
Brilliant Benzo Fast Yellow GL—(IG)	300
Brilliant Benzo Green B—(IG)	450
Brilliant Sky Blue 8G Extra Powder—(IG)	
Brilliant Sky Blue 8G Extra Powder—(By)	1,041
Brilliant Sky Blue R, 2RM—(IG)	500

Name of Dye and Manufacturer	Quantity (pounds)
Chloramine Fast Orange G Conc.—(S)	500
Chlorantine Fast Blue 4GL—(I)	1,763
Chlorantine Fast Green B—(I)	1,102
Chlorantine Fast Violet 5BL—(I)	3,307
Developed Brilliant Green 3G—(By)	661
Developed Brilliant Scarlet 2BLX Conc.—(By)	412
Developed Pure Blue B—(By)	551
Diamine Azo Light Yellow 2G—(C)	551
Diamine Catechine B—(IG)	250
Diamine Catechine 3G—(IG)	100
Diamine Fast Brown CF—(IG)	100
Diamine Fast Brown GBB—(IG)	400
Diamine Fast Brown 3G—(IG)	100
Diamine Fast Orange ER—(IG)	1,700
Diamine Jet Black OO—(IG)	500
Diaminogene Blue 2G—(C)	551
Diazo Brilliant Blue 2BL Extra—(IG)	200
Diazo Brilliant Green 3G—(IG)	200
Diazo Brown 6G—(IG)	250
Diazo Fast Blue 2BW—(I)	331
Diazo Indigo Blue 2RL—(IG)	400
Diazo Sky Blue 3G, 3GL—(IG)	800
Diphenyl Fast Blue 4GL Supra—(G)	55
Diphenyl Fast Bronze B—(G)	1,102
Diphenyl Pure Yellow 5G Conc.—(G)	55
Direct Azo Green 3G Powder—(C)	605
Direct Cutch Brown N—(I)	110
Direct (Benzo) Red 12B Powder—(By)	133
Fast Cotton Gray BL—(IG)	500
Fast Cotton Gray VL—(IG)	200
Fast Cotton Rubine 5B—(IG)	100
Oxydiamine Black SOOO—(IG)	300
Oxydiamine Black VS Extra Conc.—(IG)	200
Para Orange G—(IG)	86
Toluylene Fast Orange LX—(IG)	100
Triazol Fast Orange 2RL—(GrE)	79

Direct Dyes for Artificial Silk

Blue Extra Paste—(IG)	100
Celatene Black Paste—(SD)	50
Cellit Fast Yellow 2GN—(IG)	100
Celliton Red R Paste—(IG)	100
Cibacette Diazo Black B Paste—(I)	110
Cibacette Red 3B Paste—(I)	110
Duarnol Orange G Paste—(BDC)	56
Duranol Red 2B Paste—(BDC)	106
Ionamine L Paste—(BDC)	56
Setacyl Direct Blue 2GS Powder—(G)	110
Setacyl Direct Blue R Powder—(G)	220
Yellow R—(IG)	50

Rapid Fast Dyes

Rapid Fast Orange RG Paste—(IG)	1,500
Rapid Fast Red B Paste—(GrE)	225
Rapid Fast Red LB Paste—(IG)	300
Rapid Fast Red GZ Paste—(IG)	1,000

Basic Dyes

Bromofluorescein A Extra—(M)	220
Chrome Fast Xanthine 2R—(DH)	220
Rhodamine 6GH Extra (s. s.)—(S)	6,500
Rhoduline Scarlet G—(IG)	441

Sulphur Dyes

Indocarbon CL Conc.—(IG)	2,750
Indocarbon SN Conc.—(IG)	500

Name of Dye and Manufacturer	Quantity (pounds)
Pyrogene Blue Green B—(IG)	55
Pyrogene Brown G—(I)	331
Pyrogene Cutch 2R Extra—(I)	220
Pyrogene Pure Blue 3GL—(I)	551
Pyrogene Pure Blue 2RL—(I)	220

Spirit-Soluble and Color-Lake Dyes

Auramine Stearate—(StD)	2
Brilliant Helio Green GG Extra—(By)	100
Hansa Yellow G Powder—(IG)	200
Hansa Yellow GSA Powder—(IG)	1,000
Helio Bordeaux BL Paste—(IG)	
Helio Bordeaux BL Powder (s. s.)—(IG)	4,677
Helio Red RMT Extra Powder—(IG)	650
Pigment Green B Paste—(IG)	200
Rhodamine Stearate—(StD)	22
Safranine Stearate—(StD)	22
Stone Rubine BN Powder—(IG)	500

Unclassified Dyes

Icyl Brown G—(BDC)	114
Icyl Orange R—(BDC)	114
Grasol Blue GR—(G)	17
Grasol Orange G—(G)	4
Grasol Scarlet G, 2G—(G)	4
Rotor Chocolate—(BDC)	1
Rotor Red B—(BDC)	2
Rotor Yellow G—(BDC)	3

LIST OF APPRAISEMENTS OF COAL-TAR PRODUCTS WITHIN PARAGRAPHS 27 AND 28 OF THE TARIFF ACT OF 1922

The following supplemental list contains the month of entry, the name of the product within paragraphs 27 and 28, together with the designation as "C" (for competitive) and "NC" (for non-competitive), which indicates the appraisement basis for the assessment of the ad valorem duty in paragraphs 27 and 28 of the Tariff Act of 1922.

The ad valorem rate for competitive dyes is based on the American selling price, as defined in Subdivision (f) of Section 402 of Title IV; the ad valorem rate for non-competitive dyes is based on the United States value, as defined in Subdivision (e) of Section 402 of Title IV of the Tariff Act of 1922.

JANUARY, 1927

Alizarine Light Blue SE Conc	C
Alizarine Sky Blue B Powder	NC
Anthra Scarlet 2G Paste	C
Anthracene Brown PG	NC
Benzyl Green B	C
Brilliant Acridine Orange 3R	NC
Brilliant Sky Blue 8G Extra	NC
Brilliant Sulphon Red 5B	NC
Chlorantine Fast Blue 2GL	C
Chlorantine Fast Brown 3RL	NC
Chlorantine Fast Green B	NC
Chlorantine Fast Yellow 4GL	NC
Chromazurine E	NC
Chromocitronine 3R	NC
Ciba Red 3B Paste	NC
Developed Brilliantine Green 3G	NC
Lanasol Blue R	NC
Omega Chrome Red B Conc	C
Thio Indigo Red 3B Powder	NC
Vat Blue BCS Powder	C
Vat Red RK Paste	C
Xylene Fast Blue FF Conc	NC

FEBRUARY, 1927

Alizarine Light Blue B	C
Alizarine Red SW	C
Anthra Scarlet 2G Paste	C
Brilliant Chrome Violet 4B	NC
Brilliant Delphine Blue B	C
Brilliant Sulphon Red 10B	NC
Chlorantine Fast Blue 8GL 30%	NC
Chlorantine Fast Yellow RL 85%	C
Chromazurine G	NC
Chrome Fast Xanthine 2R	NC
Chrome Orange I	NC
Chromacitronine 3R	NC
Ciba Pink BG Powder 68%	C
Ciba Scarlet G Extra Paste 20%	C
Ciba Violet BL 35%	C
Cibanone Blue G Powder 81%	C
Cibanone Blue 3G Paste 10%	NC
Cibanone Orange R Powder 76%	NC
Cloth Fast Blue B 52%	NC
Cloth Fast Yellow G 40%	C
Diazol Light Red N8B	C
Kiton Blue A 82%	C
Kiton Fast Red 4BL 75%	NC
Kiton Fast Yellow 3G 81%	C
Lanasol Blue R 90%	NC
Madder Red Powder	C
Methylene Green G Extra 79%	C
Modern Azurine 5G	NC
Neolan Blue 2G 40%	NC
Neolan Yellow R 28%	NC
Pyrazol Orange G Conc	C
Thio Indigo Orange R Powder	C
Trisulphon Brown GG Conc	C
Ultra Cyanole B Conc	NC
Wool Green S Conc. 71%	C
Xylene Cyanole FF Extra Conc	NC
Xylene Fast Blue FF Conc	NC
Xylene Milling Blue BL Conc	NC

MARCH, 1927

Alizarine Light Blue B	C
Benzo Brilliant Pink G	C
Black Lake	NC
Chloramine Red B	C
Chloramine Red 3B	C
Diaminogene Blue NA	C
Fur Brown PR	NC
Indanthrene Blue GCD Double Paste	C
Indigosol Yellow HCG	NC
Madder Lake 71 Extra Powder	C
Madder Red Powder	C
Natural Raw Native Bengal Indigo	C
Omega Chrome Brown EB	C
Omega Chrome Red B Conc	C
Pyrazol Orange G Conc	C
Trisulphon Brown B Conc	C
Trisulphon Brown GG Conc	C
Ultra Orange R	NC
Viridine Lake Powder	C
Xylene Blue AS Conc	C
Xylene Light Yellow GG	C
Xylene Milling Orange R Conc	NC

APRIL, 1927

Alizarine Crimson Lake	NC
Brilliant Sulphon Red B	C
Madder Lake 51875 Powder	C
Madder Lake VN 14 Powder	C
Natural Raw Native Bengal Indigo	C
Omega Chrome Brown EB	C
Rhodamine B Extra	C
Trisulphon Brown B Conc	C
Vat Brilliant Blue R Paste	C
Vat Red RN Paste	C
Viridine Lake Powder	C
Wool Green S Conc	C

EDUCATIONAL COURSES IN CONNECTION WITH THE CHEMICAL EXPOSITION

WHEN the Eleventh Exposition of Chemical Industries opens in the Grand Central Palace for the week beginning September 26 to October 1, 1927, an educational opportunity will be offered through the students' course on the fundamentals of chemical engineering and industrial chemical practice. The committee and exposition management have arranged lecture courses by leading authorities in their various subjects. These speakers are preparing to give the students of chemistry and chemical engineering a prospective of the industry as a whole. The classes will be divided into two groups—the advanced students who have had sufficient training or experience to understand how chemical equipment is made and works, and another section made up of students who have not had the opportunity or experience in unit practice or processes and their method of operation.

Registration begins Monday noon, September 26, at the exposition and class work starts at 3 p. m., when all students will meet for a general lecture. Lectures will be given on each day for four days beginning Tuesday morning, September 27, as follows:

Arthur D. Little—"Ethics and Ideals of the Chemical Profession"; H. C. Parmelee—"What the Chemist and Engineer Reads"; H. E. Howe—"What the Chemist and Engineer Writes"; William Haynes—"How the Products Chemists Make Are Sold."

These lectures will be of a broad general scope and of value to all students. The subsequent lectures, going into the detail of unit practices for Section One, will be of a more elementary nature and will illustrate and confine to the simplest possible statement the principles involved and descriptions of typical apparatus.

The plans call for two lectures a day for four days, and will include consideration of the following:

Disintegration—Crushing, grinding and pulverizing.

Mechanical Separation—Separation of solids from solids; separation of solids from liquids; separation of solids from gases; filtration, grading and classifying; centrifugal separation, settling, thickening, dust collection and precipitation; separation of liquids from liquids, etc.

Separation with Phase Changes—Evaporation, distillation, drying and the theory and discussion of apparatus.

Handling of Materials—Vertical, lateral and horizontal transportation.

Materials of Construction—What materials to use, when, where and why.

Among the speakers will be: Arthur Wright, of Filtration Engineers, Inc.; S. B. Kanowitz, of Raymond Bros. Impact Pulverizer Company; W. A. McAdams, of Massachusetts Institute of Technology; A. E. Marshall, of Corning Glass Works.

Among the speakers for Section Two will be: E. J. Sweetland, of United Filters Corporation, on "Mechanical Separation"; Separation of Solids from Liquids, Filtration, Continuous and Intermittent; G. Edwin White, Chemical Engineering Department, College of the City of New York, "Safety in the Laboratory and Plant"; F. A. Ernst, Fixed Nitrogen Laboratory, U. S. Department of Agriculture, "High Pressure Equipment."

In addition to these lectures it is planned to have competent guides conduct tours of inspection from exhibit to exhibit following closely upon the various lectures.

Many new and interesting developments and processes are causing much interest from students and industry from all parts of the world. Among the new exhibits to be shown for the first time is the new aluminum alloy invented by the late Victor E. Hybinette and perfected by his father, Victor Hybinette, which is revolutionary in metal alloys, inasmuch as it will be of great importance wherever nickel-plated metals were used. It is non-tarnishing and can be treated to a strength very much greater than aluminum.

The United States Government exhibits will be of decided interest and importance. The management of the exposition reports that at a meeting of the bureau chiefs held in the office of the Secretary of Commerce, it was decided that the Department of Commerce as a whole would exhibit for the Bureau of Foreign and Domestic Commerce, Bureau of Standards, Committee on Wood Utilization, Division of Chemicals, Division of Simplified Practice and the Machinery Division. Particulars and details regarding these exhibits will be released later, together with particulars regarding the exhibit from the Department of Agriculture.

GLUE AS BEATER SIZING

DURING the World War the shortage of rosin and of the better grades of paper-making materials in Europe led to the development of processes involving the use of glue in the beating-engine stage of paper manufacture. It has been claimed that through such uses of glue paper could be rendered water resistant or sized, as is ordinarily done with rosin, and that papers made from cheaper raw materials, including rather large proportions of mineral fiber, would be materially improved in strength and other desirable qualities. The processes referred to generally involve the use of aluminum compounds to jell the glue solution before its use.

Certain paper manufacturers in this country ordinarily use glue in conjunction with rosin sizing to impart special characteristics to their products. This use of glue has not become more common because under some conditions glue causes excessive foaming in the beating engine. When this occurs, a large proportion of the glue remains in solution and is lost in the waste water from the paper-making machine.

The possibility of improving certain desirable qualities of paper and in this way extending the use of cheaper paper-making materials, such as reclaimed papers and mineral fillers, has led to a study of the use of glue in the beating engine by the bureau in co-operation with the Glue Research Corporation (see T. N. B. No. 106, p. 5, and T. N. B. No. 115, p. 5). This study included consideration of several glue-jelling agents, comparisons of jelled glue and glue solutions, the use of different kinds of pulps and of several grades of glue, as well as several modifications of the paper-beating procedure.

It has been found that the jelling of the glue before adding it to the beater offers no advantages over the use of glue solutions, but that if good retention of the glue in the finished paper is to be obtained the hydrogen-ion concentration or active acidity of the beater contents must be carefully controlled. By regulating the addition of alum to the beater, so that the water from the paper machine has an acidity of about 4.5 (pH), the foaming during the beating and subsequent operations is reduced to a minimum. Also, at this acidity, the retention of glue in the finished paper is generally at its maximum. The retentions of glue compare favorably with those of clay filler under similar conditions. Optimum operating conditions are obtained by furnishing the paper-making materials to the beater in the following order—pulp, filler (if used), rosin size, alum, glue, the glue being added about one hour before the beating is completed.

Experimental papers containing glue without rosin size, when dried on the cylinders of the paper-making machine, were found to be unsized (waterleaf). Similar papers, when air dried at room temperatures, were found to be only slightly sized and unfitted for writing purposes. These papers vary but little in strength qualities from similar waterleaf papers made without glue, although the glue-containing papers do seem harder and firmer than the others.

In papers containing both glue and rosin, the strength is frequently, and the degree of sizing is generally, improved as compared with similar papers when sized with rosin alone. The chief influence of the glue on various types of paper seems to be to improve such intangible properties as firmness, hardness, rattle, and handling qualities. In these respects, experimental sulphite writing papers containing glue seem to approach rag-content bond qualities rather than those of commercial sulphite papers. The improvements in strength qualities, degree of sizing, and the intangible qualities just noted are especially marked in book papers containing clay filler.

A complete report of this work is given in an article, "Glue As Beater Sizing," published in the January 20, 1927 issue of Paper Trade Journal.—Technical News Bulletin, Bureau of Standards.

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
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THE COST OF CHEAPNESS

A LARGE proportion of American textile mills are producing fabrics that approach as near to perfection as the textiles of any other country in the world. That there is always ample room for improvement in spite of this fact will be granted, of course, by any intelligent person in the industry. May there never come a day when our products cannot be made better or at lower cost!

The phrase "at lower cost," however, carries more than one implication, depending upon who uses the phrase. Those mills that have conscientiously built up the prestige of American goods use the phrase but one way; to them "lower cost" means greater efficiency of plant operation with no sacrifice whatever of quality in the product. But we shall always have with us a small class of shyster manufacturers who seemingly forget that textiles are made to use and are bought for no other purpose. They are in business to make, not good textiles, but good profits.

The means taken by such manufacturers to increase their profits are characteristic of their near-sighted philosophy. They employ the cheapest labor. They install bargain-sale machinery throughout their mill. Much of this equipment is old-fashioned, and they even manage to struggle along without some equipment which most other mills find absolutely essential. Finally they "shop around" for their supplies and collect a queer assortment of second-rate chemicals and colors; any kind will serve so long as it costs two cents less than another brand.

They then turn about and with what they probably believe is shrewd business judgment, endeavor to camouflage these efforts to lower production costs by buying a fairly good grade of raw material—cotton, wool, whatever it may be. This is done with the idea that many buyers judge goods mainly by the "feel" and carelessly or ignorantly overlook defects of weaving, dyeing and finishing. If a fabric *feels* like good cotton, they believe it will easily sell. Does it seem possible that a mill can operate for any time on such a fallacy as this? Yet we know that the condition exists.

These goods made "at lower cost" eventually reach the shelves of retail merchants, and for a while actually sell. They may even sell for more than well-made brands because of their style. But obviously they never give service to the buyer. They may *wear* because of the quality of the raw material in them; but this very wearing quality proves to be their undoing: the longer they are worn the more clearly is their true nature revealed. They soon fade because they have been dyed improperly with cheap dyes. They do not launder well and cannot safely be dry-cleaned. They are responsible for most of the damage claims received by stores, laundries and cleaners.

When orders for such goods begin to drop off the manufacturer complains of poor business conditions. The real reasons for the "slump" are that the American shopper's taste for textiles has been educated during the past few years and the American shopper's pocketbook has been fattened. Trade-mark buying has made the market unsafe for cheaply made goods. Finish, beauty of shade, color fastness—these are now sought and willingly paid for because the buyer is protected by advertised trade-marks that have come to stand for certain definite qualities. Mills making the cheaper grades of goods do not dare trade-mark them. According to present-day standards, they blacken the reputation of their fabrics as soon as they lower the quality of a single item—especially if that item is dyestuffs.

COMPETING WITH THE LAW COURTS

THE austere magistrate with his weighty tomes of law has a wide-awake competitor who is steadily becoming more popular among business men. The law court's enterprising rival is the modern arbitrator. A vigorous campaign for the arbitration of commercial disputes has been under way for several years, sponsored by the American Arbitration Association. Business men have been strongly attracted to the idea of settling their differences out of court, free of the law's delays and unburdened by the law's expense.

In the silk industry, to take a familiar example, twenty-five cases have been successfully cleared up in the past six months by arbitration before the Silk Association of America. Silk manufacturers, dyers, dealers and factors have preferred the judgment of business men to the judgment of court decisions in settling their business controversies. In such procedure there is no regulation by any outside organization. Each trade is establishing its own arbitral agency. The silk trade was among the first to set up

a standard, formal procedure for arbitration, more than a quarter of a century ago.

In adopting the principle of arbitrating their disputes members of trade groups avail themselves of a far more liberal, sensible interpretation of business law than that which underlies most legal court verdicts. Cases are heard before arbiters who represent their own industry exclusively, and who can therefore judge the circumstances of each case with a degree of insight unattainable in any judicial court. Issues are not beclouded by technicalities, nor decisions deadlocked by red tape. The temper of the disputants and their good-will toward one another are not broken on the ponderous wheel of the law. The dispatch and simplicity with which cases are handled markedly contrasts with the law's intricacies and costly delays. As nations have decided that war is uneconomic, so modern business is accepting the view that legal action is inefficient and that arbitration offers the most satisfactory means of settling its contentions.

COTTON BAGS TO SUBSTITUTE BURLAP

Ever since the announcement of a bumper cotton crop, ways and means have been proposed for using up the surplus in order to maintain a stabilized market and protect the cotton farmer. Someone suggested that cotton fabric be used for wrapping bales of cotton instead of the usual burlap bagging. Experiments in producing a fabric for the purpose have just been completed at the State College Textile School, Raleigh, N. C. They were undertaken at the request of the United States Department of Agriculture and, according to Dr. Thomas Nelson, dean of the Textile School, the studies have been successful.

One billion yards of burlap is annually imported by the United States from India, according to figures issued by the Government. It is estimated that the substitution of cotton for the jute products now used in the United States and the other possible new uses that may be taken advantage of as a result of the research activities of the Department of Agriculture and the textile schools will increase the consumption of cotton about 2,000,000 bales a year.

The adoption of the cotton bagging for cotton bales and the substitution of cotton for jute in the manufacture of cord, twine and bags of different kinds will enable the farmer to find an outlet for his low-grade cottons and the new market will tend to offset recent depressing effects.

METZ AIDS TEXTILE HIGH SCHOOL

Each year the students of the Textile High School compete for prizes donated by Col. H. A. Metz for proficiency in batik and dyeing and chemistry and dyeing. The awards for 1927 have been announced as follows: Batik and dyeing: First prize, Anna Hudak; second prizes, Lena Saslowsky and Katherine Muller. Chemistry and dyeing: First prize, Harry Dwoskin; second prize, Albin Bschorr.

The future of the Textile High School seems splendidly assured through the recent action of the Board of Education, in response to agitation by Colonel Metz. This institution acts as a feeder for the ranks of textile workers. At present it is scattered in five buildings throughout New York City. The recent resolution of the board will result in housing all the activities of the Textile High School in one modern building to be located on the upper west side.

INDUSTRIAL POISONS AFFECTING EYESIGHT STUDIED

Workers in dye plants, along with those in a score of other industries, are continually exposed to methanol poisoning, according to a report made to the American Chemical Society by Joshua Eyre Hannum, research engineer of the Eyesight Conservation Council. Methanol is described as probably the most deadly industrial poison. Widely used in many different manufacturing plants, it is said not only to produce such serious effects upon the retina of the eye and the optic nerves that total blindness almost invariably develops, but it may also cause blindness if taken internally.

Industrial groups exposed to the hazards of methanol include artificial silk makers, dimethyl sulphate makers, felt hat workers, ink makers, soap makers, perfume makers and workers in many other trades.

Lead and its compounds, the report asserts, is one of the most dangerous industrial poisons, for it produces, among other things, atrophy of the optic nerve, permanent blindness being the outcome of complete atrophy.

Poisons were found to enter the body most frequently through the respiratory system in the form of gas, vapor or dust. They may, however, enter by absorption through the skin, and in some instances they are carried into the body by food that has come in contact with the poison on the hands of the worker.

"The big problem in safety work," the report adds, "is gaining the co-operation of the workmen. This especially is true in providing effective eye protection, for in most instances the safeguards must be worn by the workers.

"There is a natural objection to goggles on account of inconvenience and discomfort, but sufficient attention has not been given to the details of comfortable adjustment and proper fitting of the goggles to the face of the individual workman.

"The problem will not be solved until the importance of eyesight tests in industry is fully appreciated and goggles are used to serve the dual purpose of aiding vision and protecting the eyes.

"Experience has proved that well-organized safety work will effect high reductions in eye accidents. Some companies report that they have been able to reduce eye accidents by as much as 90 per cent through the introduction of and persistent adherence to proper safety measures."

Practical Hints on the Production of Bright Colors on Textile Fabrics

Part XXXI

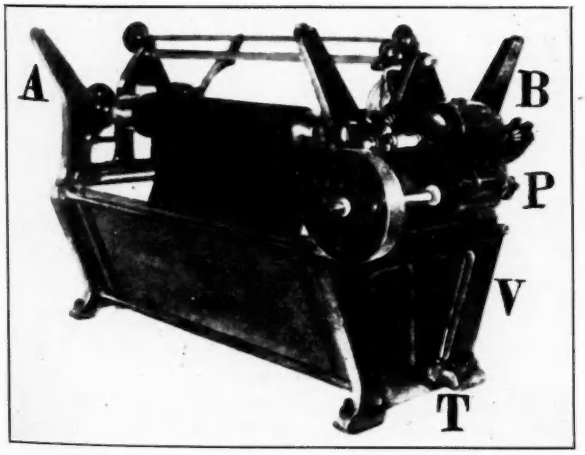
An Improved Type of Jig—Its Construction and Operation—Special Features

By RAFFAELE SANSONE

THE improved type of dye jig shown below has found its way recently in the dyehouse, where it gives excellent results. It contains a solid iron frame of two sides A and B, and of the four long iron rods, which keep the sides upright and parallel. Sides A and B are bolted solidly to the floor of the mill, and between them is placed the dye vat V.

This is constructed preferably of an iron-silicon alloy, resisting the action of rust and of the sulphide of soda present in the dye baths, and its interior is of porcelain or other suitable white enamel, and contains two binding rollers covered over with rubber. Vat V can be easily washed with a little warm water and a brush, when it is necessary to change the color. At the bottom is furnished a steam coil for the heating of the different baths and a tap T for withdrawing old dye baths or other baths of treatment. The upper portion of frames A and B contains ball-bearings, in which revolve noiselessly two winding rollers, preferably of porcelain, and worked automatically by pulley P.

An innovation of special character and importance in the above plant is the disposition applied to the movement of the cylinders. Through this the speed of the cloth is regulated, maintaining it equal and constant during the whole of the dyeing process. To eliminate the plaits and widen the pieces gradually during the dyeing, vat V is supplied with a special spreading and opening device. When the fabric has been entered on the moving rollers, all work is conducted automatically, the pieces of cotton cloth making a certain number of ends through the dyeing liquid, such as are required by the shade. The number of such passages is fixed on a dial with which the machine is equipped.



When the number of passages arranged for have been completed, the machine is stopped automatically. The number of such passages can be reduced or increased during the movement of the plant, in accordance with circumstances and without interrupting in any way the dyeing process. The bringing out of gear of the winding cylinders is done smoothly and without any tension being exerted throughout the length of the pieces; this is of particular advantage especially when treating delicate fabrics. Each winding roller communicates with a strong hand brake, which the operative can easily work in accordance with needs.

For dyeing with sulphur colors, the machine is supplied with a special squeeze arrangement, applied in such a manner that it can be used or not in accordance with the requirements of the dyeing operations. Besides this it is constructed in two types, that is, for winding rollers from 27½ inches of diameter of batch and 39¾ inches diameter of batch. Both types can be made to take up to about 86½ inches working width. Four and even more of the above jiggers can be attended and worked by only one operative, and this represents a notable economy in cost of operation.

Operation of the Jig

To operate the plant, the roll of cotton cloth to be dyed is entered, pouring a measured volume of boiling water in vat V, and adding to this a small quantity of carbonate of soda and the necessary salt or sulphate of soda required for the dyeing operations. At this point, the dyestuff solution is entered, and the number of ends to be given to the cloth is fixed, setting the hand of the dial, and the plant started. This then continues its work automatically, causing the cotton fabric to pass continually through the bath of treatment. At each end the corresponding roller is pulled slightly, bringing about an immediate inversion in the direction followed by the fabric, without causing any extra longitudinal tension. When in this way the desired number of runs through the dye bath

has been conducted, the mechanism functioning in connection with the counting starts moving, and the jig is stopped without the interference of the operative.

At this point the squeezing arrangement, already indicated, is lowered to wring from the cloth all excess liquid. The fabric makes its way for the last time through the bath of treatment, and is carried into a second jig for rinsing with abundance of clean running water.

Advantages of the Plant

The above plant possesses several marked advantages, some of which can be indicated as follows:

1. The baths used for the dyeing operations are entered in a vat in which no spoiling can come about through the presence of old dyestuff, or through rust or other reasons, and in which leakage is impossible.
2. The dye vat can be taken out of the plant whenever necessary for repairs.
3. The number of ends to be given to each batch of cloth can be regulated from the start, so that the machine stops of its own accord when this number has been reached. For this reason the operative, when once he has started the dyeing operations on one jig, can proceed with work on others.
4. Operation of the machine is performed quietly.

(*The next instalment will appear in an early issue.*)

Technical Notes from Foreign Sources

Rate of Oxycellulose Formation

This is the title given to an investigation on the chemical analysis of cotton as reported in the Journal of the Textile Institute, 1927, pages 1135-1167. Measurements were made of the rate of consumption of oxygen, and of the rate of change in the properties of the material when bleached cotton is treated with hypochlorite solutions of constant active chlorine content, but of varying acidity of alkalinity. Within the range of hydrogen ion concentration pH5 to 10, characteristic of technical bleach liquors, the maximum rate of oxycellulose formation occurs at the neutral point. Under controllable conditions, slightly acid hypochlorite solutions are less rapid in their action upon cotton than neutral solutions, though they are very susceptible to influences, presumably of a catalytic nature, which are not easily controlled and which greatly increase their activity. These results were obtained by the use of buffered hypochlorite solutions, and evidence is adduced to show that the qualitative effects described are due to variation of hydrogen ion concentration and not to specific effects of the buffer salts.

Comparisons were also made between the rate of oxycellulose formation with hypochlorite and with hypobromite both in strongly alkaline solution, and the latter is shown to be a much more rapid oxidizing agent. Measurements were also given of the rate of oxycellulose formation with dichromate in aqueous solutions of varying acidity. The action of dichromate is much more rapid in the presence of dilute oxalic acid than in that of sulphuric acid of the same equivalent concentration, and there is close analogy between the rapid discharge of Indigo with dichromate-oxalic acid mixtures and the rapid formation of oxycellulose by the same reagent.

The presence of small amounts of chromium in cotton greatly increases the rate of cellulose oxidation by the hypochlorite solutions. Oxycelluloses formed by the action of dichromate in sulphuric acid solution contain traces of chromium which cannot be removed by washing, and they are therefore attacked very rapidly in subsequent hypochlorite treatment. Oxycelluloses formed by the action of dichromate in oxalic acid solution are readily obtained free from chromium and they are not more susceptible than unmodified cotton to hypochlorite oxidation.

Streaky Dyeings on Rayon Fabrics

Viscose rayon, no matter how carefully it may be dyed, often gives uneven shades. This may be either a two-color or shot effect, which is due to the larger dark and light surfaces alternating with one another; or actual differences in depth of shade may occur in more or less uniform formation. In ready made goods, especially tricots, this latter phenomenon produces a striped effect, and may be attributed to the influence on the adsorption of dyestuffs of irregularities in the thickness of the fiber, the fineness of the rayon fiber and the degree of dispersion of the fiber substance. This latter in turn depends on different factors, for example, the use of mixtures of different celluloses and irregularities in mercerization, sulphonation, aging and coagulation.

The determination of oxycellulose in viscose rayon by means of a warm silver nitrate solution, prepared by the addition of concentrated ammonia to a 10 per cent solution of silver nitrate until the precipitate at first formed redissolves, is an indication of whether the goods will become streaky on dyeing. This reagent can also be used advantageously for the detection of weak spots which form holes on dyeing. (Leipsigner Monats. Textilindustrie, 1927, Vol. 42, p. 116.)

Testing Dyestuffs for Fastness to Washing

All the methods employed for the measurement of fastness of dyestuffs depend upon visual comparison. It is well known that the judgment of different observers is not always the same. In comparing the resistance to washing of a number of dyestuffs of the same color, it was found that the visual observation method could not be entirely relied upon to give the correct answer to the problem, particularly in that it was required to arrange the dyestuffs in order of their increasing or decreasing resistance to washing. The following method was therefore devised, and it was found to give consistent results with the same dyestuff. It was possible to express the fastness of dyeing in numerical terms.

A dyeing was made under standard conditions, the dyed sample being washed and dried. A weighed portion of the dried sample was tested for fastness to washing under the standard conditions. At the end of the test the soap liquor was squeezed back into the bath, the sample was washed with hot distilled water, the washings being added to the liquor in the bath. The soap liquor and the washings were then cooled and made up to a definite volume with the aid of distilled water. A portion of this solution, for example 50 c.c., was placed in a Nessler cylinder, and in a second cylinder the same volume of soap solution containing the same quantity of soap as the diluted dye liquor. A standard solution of the dyestuff, for example 0.01 per cent, was then run in from a burette until the colors of the two solutions matched each other. From the volumes of the dye solution used, the quantity of dyestuff extracted during washing was calculated and expressed as a percentage on the weight of the fabric used.

It was possible in this manner to arrange a number of dyestuffs in order of merit. The test was repeated with freshly dyed samples and found to give consistent results. (Journal of the Society of Dyers and Colorists, 1927, Vol. 43, p. 192.)

Fast Colored Resists Under Aniline Black

Material padded with aniline is printed with the enol ester of a vat dyestuff to which is added a body which has an acid reaction on steaming, and the goods are finished in the usual manner for the production of Aniline Black. A suitable printing color is prepared with 80 grams of Indigosol O4B, 370 c.c. of water, 500 grams of neutral wheat starch-tragacanth thickening, 50 grams of neutral ammonium oxalate, made up to a total weight of 1 kilogram. After printing the goods are steamed for a period of three minutes, passed through a weak bath of potassium dichromate, washed and soaped. The process overcomes the objectionable formation of halos in the resists under Aniline Black produced with vat dyestuffs by other methods. (British Patent No. 247,211.)

Protecting Animal Fibers During Dyeing

Resinous sulphonic acids which are obtained from the condensation products of aromatic or hydroaromatic hydrocarbons with sulphur chloride, alkyl, aryl, or aralkylchlorides, alcohols, etc., are added to the mordanting and dyeing baths. These substances protect the animal fiber from being injured by the chemicals present in the liquors. An example of such a substance is sulphonated benzylnaphthalene resin. (German Patent No. 435,899.)

White and Colored Reserves Under Sulphur Colors

The object of the investigation was to devise a method for the manufacture of certain textile merchandise, such as scarfs and handkerchiefs, on which white or colored effects are obtained under sulphur colors, the method being of the character of printing colored resists.

In manufacturing these articles the fabric is first mercerized. The mercerization has for its purpose the enhancing of the brilliancy of the fiber, and in addition thereto the increased affinity of the fiber for the sulphur colors. The process can be carried out with the aid of a solution of sodium hydroxide which is of lower concentration than customarily employed for this purpose. A solution of 18 deg. Be. concentration will give satisfactory results in this case. The reserve compositions, made with zinc salts base, are printed on the fabric, which has been mercerized in this fashion, and after the fabric has been dried, it is dyed in a solution which contains the sulphur dyestuff, sodium sulphide, sodium sulphate and a small amount of sulphuric acid. The addition of the latter substance to the sulphur dye liquor is necessary in order to obtain satisfactory reserves.

After this treatment the fabric is dried in a hot flue, subjected to steaming for a period of five minutes at a temperature of 102 deg. Cent., then well washed, passed through a cold solution of sulphuric acid containing 20 grams of the acid per liter, allowed to remain in a pile for fifteen minutes; then strongly washed by means of a hose, and subjected to a soaping treatment, two soap liquors being used for this purpose, the first at a concentration of 50 deg. R., the second at 65 deg. R. Then the material is washed and dried.

To obtain an article with white and red effects, the merchandise is printed after being prepared with betanaphthol at 14 grams per liter. The treatment is the same as for merchandise with white effects only.

The formulae of the various printing pastes are as follows:

For obtaining red effects, there were used three parts of 33 per cent of gum water, 100 parts of ground kaolin with gum 50 per cent, 100 parts of zinc white 50 per cent, 300 parts of zinc sulphate, the same proportion of zinc acetate and olein, and 200 parts of the diazo solution, making a total of 1,000 parts.

For obtaining white effects, 400 parts of the gum solution, 100 parts each of the kaolin and zinc white, 240 parts of the sulphate of zinc, 160 parts of the acetate of zinc and 20 parts each of olein and the diazo solution were used, also making 1,000 parts in all.

The diazo solution contained 20 parts of Naphthol Rose, 100 parts of water, 30 parts of sulphuric acid at 52 deg. Be., chilled and added a little at a time, 7½ parts of sodium nitrite which were dissolved in 15 parts of water, and after being allowed to remain fifteen minutes, 35 parts of dry sodium acetate were added. The total is 200 parts.

The acetate of zinc was made from 100 parts of zinc white and 450 parts of acetic acid at 6 deg. Be. concentration.

The dyeing liquor contains 60 parts of Immediate Green Brilliant G. Cassella, 100 parts of tragacanth solution, 250 parts of boiling water, 30 parts of sodium sulphide which are dissolved, and then a mixture of 550 parts of water and 7 c.c. of 52 deg. Be. concentrated solution of sulphuric acid was added, and finally 20 parts of sodium sulphate. The concentration of the solution is 30 deg. R. (Bulletin de la Societe Industrielle de Mulhouse, 1927, pp. 163-164.)

ARBITRATION YEAR BOOK

The States of California and Pennsylvania have recently enacted arbitration laws at the legislative sessions just ended, according to advice from the American Arbitration Association. Nearly all of the commercially important coast States, such as New York, New Jersey, Massachusetts, Oregon and California, now recognize the validity and enforceability of agreements to arbitrate disputes that may arise out of business relations. In these States business men may practically insure themselves against litigation by inserting an arbitration clause in ordinary commercial contracts, order forms and other business agreements.

The American Arbitration Year Book has been prepared and published under the direction of the American Arbitration Association, and contains a foreword by Herbert Hoover. It is the first of its kind to be issued in this country. Its purpose is to inform American business men and members of trade associations when and how they can secure arbitration in their particular trades. It tells what such arbitration will cost, what rules will govern the decision and the steps to be taken to put the award into effect. The book contains much other information on arbitration activities and procedure, and should prove a valuable reference source to those interested in simple and peaceful settlement of business disputes.

W. N. Watson has been appointed chief of the Chemical Division of U. S. Tariff Commission. Mr. Watson has been acting chief of the division since the resignation of C. R. De Long in November last.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i. e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

DYE PLANT

Well-equipped dye plant for bleaching and dyeing; about 75 by 100; in New Durham, N. J.; on reasonable terms. Good opportunity for small dyer to start in business. For information apply to The Inflexible Company, 313 Eleventh Street, West New York, N. J

WANTED

Salesman to represent old-established firm throughout New England and Canada, to push sales of their products consisting of Dyeing Machinery for hosiery and yarn, as well as Mercerizing Machinery. Must be a technically trained dyer and at same time be well versed mechanically. Full details in first letter. Address Box 409, American Dyestuff Reporter

DYESTUFF CHEMIST

Dyestuff chemist, 34, married; over ten years' experience, six years in charge manufacturing meta and para toluylenediamine, Naphthol Green, azo colors and intermediates; also some vat color experience; desires permanent connection with chance of advancement commensurate with ability. Salary $50. Address Classified Box 410, American Dyestuff Reporter.

WOOL DYER

Wool dyer with eighteen years' experience on all grades of skein and loose wool desires position. Available immediately. Address Classified Box 411, American Dyestuff Reporter.

INSTRUCTOR

Wanted—Ph.D. with knowledge of Textile Chemistry and Dye Application to teach and act as research associate in technical school. Address Box 412, American Dyestuff Reporter.

DYE CHEMIST

Chemist with practical experience in alizarine or vat colors is required by domestic manufacturer of these colors. Please state general qualifications, experience, age, salary desired. Address Box 413, American Dyestuff Reporter.